



## Surgical treatment of right lateral abdominal hernia in a heifer

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### ABSTRACT

A lateral abdominal hernia is relatively a less common incidence resulting from abdominal wall defects in cows and heifers than other types of hernias. This is usually an acquired defect, and heifers at the farm and field levels can be affected by accidental trauma or as the sequelae of poorly handled abscesses or wounds in the abdominal region involving the rupture and tear of the regional muscular intersections. An affected heifer was clinically examined, and an oval-shaped swelling on the right lateral side of the abdomen and cranial to the stifle skinfold was detected with a palpable sac having the characteristics of a prominent ring and reducible herniated mass covered by subcutis and intact skin. Being diagnosed as a right lateral abdominal hernia, the case was further surgically treated by herniorrhaphy to reconstruct the abdominal wall defects. Postoperatively, the animal was provided with intensive care and supportive medications. There are several reports on ventrolateral and ventral abdominal hernias in small ruminants; however, case studies focusing on the clinical diagnosis-based treatment of right lateral abdominal hernia in large ruminants have rarely been reported.

### Keywords

abdominal muscle tear, heifer, herniorrhaphy, ovoid swelling, reducible hernia

### Abbreviations

BW: Body Weight  
NaCl: Sodium chloride  
Ltd: Limited

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# Introduction

A hernia is the protrusion or displacement of an organ or part of tissue outside the body cavity through an unusual opening in the cavity wall which can be detected as a bulge of skin externally [1-3]. This opening is often due to the rupture of the abdominal muscles in accidents, or it seems to be a natural orifice similar to the femoral and inguinal canals. Various types of hernias are found in both small and large animals which can be categorized according to the anatomical locations, such as abdominal (lateral/ventral), incisional, inguinal, umbilical, diaphragmatic, femoral, scrotal, and perineal hernias [4-8]. In addition, hernias can also be classified into reducible and irreducible forms.

In the case of a lateral abdominal hernia, the abdominal contents protrude through an unusual orifice of the abdominal wall, and the hernia is lateral to the stifle skinfold [7]. A hernia is the most common abdominal disease in newborn calves and it is also found in heifers and other ruminants. However, the livestock farmers of rural communities often ignore this condition unless severe complications occur [9]. Several causes are associated with the development of an abdominal hernia. A lateral abdominal hernia is mainly caused by trauma due to horn thrust, animal kicks, blunt objects, jumping, falling, external force, automobile accidents, abscess in the abdominal wall, and weakening of the musculatures [2]. Moreover, congenital defects may also induce herniation in some cases [7]. Lateral abdominal hernias are usually acquired in origin just like the ventral abdominal hernias in ruminants and other species [9].

In animals, hernia reduces performance and production [7, 10] along with lowering the market value. Clinically the affected animal may present severe discomfort, pain, inappetence, and loss of body weight [2]. Diagnosis is often based on clinical inspection and palpation of the hernial contents and ring. However, radiographic imaging is used to detect the abdominal wall continuity in case of irreducible hernias [11]. Differential diagnoses may include localized cysts, abscesses, tumors, neoplastic growth, and various inflammatory swellings [2].

Treatment of hernias should be as soon as possible, otherwise, severe complications, such as incarceration and strangulation of the bowel, may arise, and the prognosis will be very poor and life-threatening. Exploratory laparotomy followed by herniorrhaphy is the most preferred surgical approach to treat this defect. In addition, the use of various types of synthetic mesh for hernioplasty is necessary when the hernial ring becomes enlarged in diameter [12]. The present study highlights the surgical correction of a right lateral abdominal hernia in a heifer through traditional

herniorrhaphy.

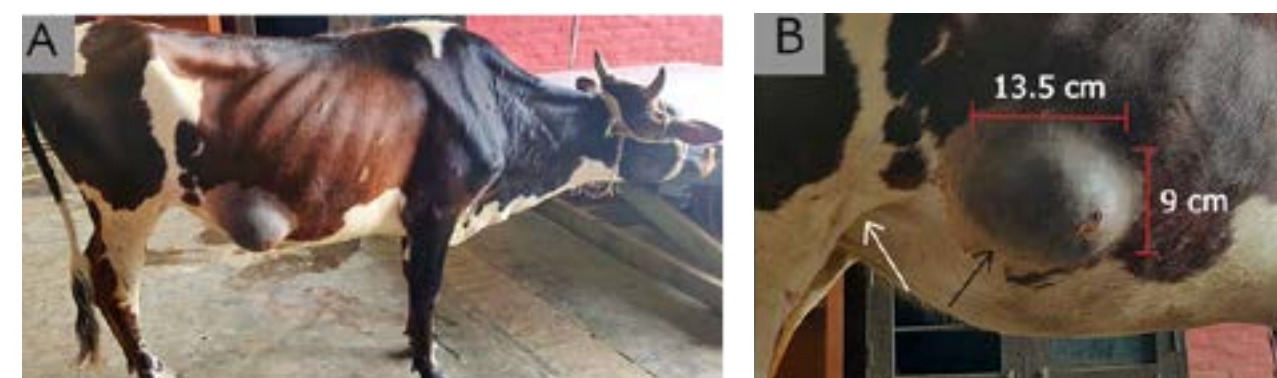
# Case Presentation

A crossbred heifer of 182 kg BW aged above 2 years was referred to the Veterinary Teaching Hospital of Bangladesh Agricultural University with the complaint of an almost round and projected type swelling in the right side of the abdomen (Figure 1A). Clinical history included previous treatment by quack for a complicated abscess by incisional drainage and, as a consequence, this lesion had emerged after a few days.

Clinical examination revealed an ovoid-shaped protruding mass covered by the skin on manual palpation with voluminous and reducible swelling along with the feeling of bulging out abdominal contents due to muscular rupture at the right side of the abdominal region having 13.5 cm length and 9 cm width (Figure 1B). It was just in a ventral-oblique position to the last four ribs and parallel and cranio-lateral to the stifle skinfold. In addition, the animal showed anorexia and apathy without any pain and systemic illness. There was a gradual increase in the size of the swelling reported by the animal owner. Based on these clinical details, the case was eventually diagnosed as a right lateral abdominal hernia.

No further diagnostic imaging was performed, and reconstruction of the abdominal wall with herniorrhaphy was decided to handle the case. The heifer was kept fasting for 12 h, and 5% dextrose in normal saline (0.9% NaCl) was administered intravenously to correct dehydration before the operation. Next, the animal was restrained in left lateral recumbency with upper exposure of the hernia being premedicated intramuscularly with atropine sulfate (Atrovet®, Techno Drugs Ltd., Narsingdi, Bangladesh) at the dose of 0.04 mg/kg BW, followed by intramuscular sedation with xylazine hydrochloride (Xylaxin®, Indian Immunologicals Ltd., Hyderabad, India) at the dose of 0.1 mg/kg BW. Presurgical aseptic procedures were completed to disinfect the skin over the defected area with 10% povidone-iodine (Viodin® 10% Solution, Square Pharmaceuticals Ltd., Dhaka, Bangladesh) after gently shaving the hairs to prepare the surgical site. Linear infiltration of 2% lidocaine hydrochloride (Jasocaine®, Jayson Pharmaceuticals Ltd., Dhaka, Bangladesh) was performed at the surgical site to achieve local anesthesia.

For herniorrhaphy, a linear and slight oblique incision was made on the skin over the area of local infiltration. Afterwards, the skin was everted, and the underlying tissues and muscles were bluntly dissected to expose the hernial sac and ring (Figure 2A). The hemorrhage was checked carefully, and the sac was incised cautiously leaving the inner content uninjured, and



**Figure 1.** A) Right lateral view of the affected heifer. B) Ovoid swelling (black arrow) on right lateral abdomen cranially to stifle skinfold (white arrow).

thereafter the contents were reduced back to the abdominal cavity (Figure 2B) ensuring no adhesion and complication. Next, the excess portion of the sac was discarded just near the hernial ring (Figure 2C), and the ring was closed properly with a simple interrupted suture using Polyglactin 910 of size-1 (Vicryl™, Ethicon, J & J Medical Devices Companies, United States) having the accurate judgment of the persistent pressure of bowel (Figure 2D).

First, two simple interrupted knots were applied at the two furthest edges of the elliptical hernial ring to provide support during the placement of the rest of the sutures. A series of simple interrupted sutures were placed through the edges of the ring. The ends of the sutures were pulled, tightened, and secured by starting from the center towards each of the commissures. Another layer of simple interrupted suture was placed over the previous one covering the associated muscles to make them more secure and stable (Figure 2E). Then, the skin was rationally closed with a hor-

izontal mattress suture modified with intermittent simple interrupted knots using Nylon threads (Figure 2F) after discarding excess loose portions. Finally, a cotton seal soaked with Viodin® 10% solution was topically applied over the suture lines (Figure 2G) to prevent contamination, and the animal was on its feet within an hour after surgery (Figure 2H). However, daily feeding with a one-half regular diet and restricting the excess movement of the animal for 3 weeks were recommended. In addition, the animal was monitored carefully with the regular administration of supportive medications, including appropriate courses of ceftriaxone at the dose of 15 mg/kg BW (Trizon Vet, ACME Laboratories Ltd., Dhaka, Bangladesh) twice daily for twelve days, ketoprofen at 3.3 mg/kg BW (Ketovet, Techno Drugs Ltd., Narsingdi, Bangladesh) once daily for four days, and pheniramine maleate at 1 mg/kg BW (Antihista-Vet®, Square Pharmaceuticals Ltd., Dhaka, Bangladesh) once daily for seven days along with strict hygienic



**Figure 2.** A) Exposed hernial sac (blue arrow) and ring (white arrowed finger point). B) Incised sac (black arrows) indicating reduced bowel (yellow circle) back to abdomen. C) Discarded sac residuals (white arrow). D) Closure of hernial ring. E) Muscle closure. F) Skin closure. G) Medicated cotton seal (black arrows) applied on suture lines. H) Heifer after 45 minutes of surgery.



measures for better healing and recovery. Fly repellent was routinely used in the animal shed to prevent myiasis. Two days after surgery, 5% povidone-iodine (Viodin® 5% Ointment, Square Pharmaceuticals Ltd., Dhaka, Bangladesh) was topically applied twice daily for the next seven days. On the 14th postoperative day, the external sutures were removed.

## Results and Discussion

In the present study, a right lateral abdominal hernia was clinically found in a heifer at the field level, which was similar to the reports of others [5, 13]. Right-sided ventral and left-sided ventrolateral hernias in abdominal regions have previously been found in various species [4, 14-16]. Moreover, these types of cases are also found in cows, buffaloes, sheep, and goats [2, 4, 11]. Ovine species have the highest percentage of hernias, followed by caprine and bovine species [14]. The mentioned heifer presented an ovoid-shaped swelling covered by skin, which contained the adjacent intestinal segments internally, and was located at the right latero-ventral side of the abdomen resembling several previous cases [5, 6, 8, 9].

According to the owner, the hernia had developed due to the mismanagement of an abscess by a local quack. This might be attributed to the tearing and rupture of the external and internal oblique abdominis, rectus, and transversus abdominis muscles during a faulty process of pus evacuation leading to a passage for protruding the voluminous bowel segments out of the cavity and underneath the subcutaneous tissues. The other causes reported for abdominal hernias are different types of external and accidental injuries, increased intra-abdominal pressure during pregnancy, loss of abdominal wall strength with age, and weakness of the abdominal muscles and tendinous intersections due to malnutrition [15, 16].

The described case was corrected by surgical interventions using herniorrhaphy, as also observed in other research [7, 17]; however, hernioplasty is conventionally used to manage extensive abdominal hernias [6, 10, 12]. Furthermore, there are several conservative treatments including the application of bandages, clamps, or ligatures, which may be helpful for the ventral and reducible abdominal hernias with smaller hernial rings [18].

This case presented a large hernial ring which was closed by suturing. However, in general, such type of large opening cannot be closed by suturing and requires mesh grafting. This was possible due to the availability of enough surrounding muscle flaps fairly stretched out to enclose the opening adequately during the operation. The closure of the hernial ring

involved firstly, the insertion and placement of sutures through the edges of the ring, followed by adequate tightening to deal with the steady pressure of the bowel. Another reason for this was to avoid any adhesion or entrapping of the bowel segment(s) during the whole suturing process to close the ring as it provided the ease to observe the suture lines and bowel segment(s) during pulling the suture ends and tying the knots.

The use of atropine sulfate and xylazine hydrochloride for premedication and sedation, and 2% lidocaine hydrochloride for local anesthesia in this study are in agreement with other research findings [3, 19, 20]. In this case, Polyglactin 910 of size-1, a synthetic absorbable suture material, was used as internal sutures for muscle closure in a simple interrupted pattern, and Nylon thread was used for skin closure in a horizontal mattress pattern, which were similar to several other reports [3, 11, 21]. In addition, various types of suture materials, such as polyglycolic acid or polydioxanone with simple interrupted, simple continuous, interrupted cruciate, overlapping mattress, and tension-relieving suture patterns have been used for closing hernial ring as well as abdominal wall defects [2, 21, 22].

This case experienced no further complications, and the animal gradually recovered one month after surgery. However, in some reports, postoperative complications, such as wound infections, abscesses, prosthetic infections, seroma, hematoma, and hernial recurrences have been found [23, 24]. The absence of such complications, in this case, might result from appropriate supportive medications and routine postoperative care and management. In conclusion, the right lateral abdominal hernia in the heifer can be successfully treated by surgical repairing with herniorrhaphy depending on the accessibility of muscle closure by suturing.

## Authors' Contributions

MRM performed surgery, case follow-up and manuscript writing. RIM and ST performed clinical examinations, review literature and manuscript draft.

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## Competing Interests

The authors declare that they have no competing interests.

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